

What is claimed is:

- Sub A*

1. An apparatus for supporting a substrate, comprising:
a support plate having a first side adapted to support the substrate and a first edge bounding a portion of the first side;
a first body rotationally disposed proximate the first edge; and
a first pushing member radially coupled to the first body and adapted to urge the substrate in a first direction parallel to the first side when the first body rotates.
2. The apparatus of claim 1, wherein the first body has a rotational axis parallel to a plane of the support plate.
3. The apparatus of claim 1, wherein the first pushing member has a first rotational axis defined by the rotation of the first body and a second rotational axis orientated different than the first rotational axis.
4. The apparatus of claim 3, wherein the second rotational axis is perpendicular to the first rotational axis.
5. The apparatus of claim 1, wherein the first pushing member has a concave face adapted to urge the substrate, wherein the first direction is tangent to the concave face.
6. The apparatus of claim 1, wherein the body is coupled to an actuator.
7. The apparatus of claim 1 further comprising:
a roller coupled between a rotational axis of the body and the first pushing member.
8. The apparatus of claim 1, wherein the body further comprises:
a first flange;
a second flange;

a center portion coupling the first and second flanges;
a first hole formed through the first and second flanges coaxial with a first axis of rotation of the body; and
a roller disposed between the first and second flanges, the roller having an second axis of rotation orientated parallel to the first axis of the body, the second axis defined between the first axis and the center portion.

9. The apparatus of claim 8 further comprising a biasing member disposed between at least one of the first and second flanges and the roller, the biasing member adapted to urge the body about the first axis.

10. The apparatus of claim 8 further comprising:

a cooling plate; and
an actuation finger coupled to the cooling plate and adapted to urge the roller as the cooling plate is displaced relative to the body.

11. The apparatus of claim 1 further comprising:

a second body rotationally disposed proximate a second edge of the support plate, the second edge disposed adjacent the first edge; and
a second pushing member radially coupled to the second body and adapted urge the substrate in a second direction that is different than the first direction when the second body rotates.

12. The apparatus of claim 11 further comprising:

a third body rotationally disposed proximate a third edge of the support plate, the third edge disposed adjacent the first edge and opposite the second edge;

a third pushing member radially coupled to the third body and adapted urge the substrate in a direction opposite the first direction when the third body rotates;

a fourth body rotationally disposed proximate a fourth edge of the support plate, the fourth edge disposed opposite the second edge; and

a fourth pushing member radially coupled to the fourth body and adapted urge the substrate in a direction opposite the second direction when the fourth body rotates.

13. An apparatus for supporting a substrate, comprising:

a first pushing member having a first rotational axis and a second rotational axis orientated perpendicular to the first rotational axis, the first pushing member adapted to urge the substrate in a first direction;

a second pushing member having a third rotational axis disposed parallel to the first rotational axis and a fourth rotational axis orientated perpendicular to the third rotational axis, the second pushing member adapted to urge the substrate in a second direction that is opposite the first direction;

a third pushing member having a fifth rotational axis disposed perpendicular to the first rotational axis and a sixth rotational axis orientated perpendicular to the fifth rotational axis, the third pushing member adapted to urge the substrate in a third direction;

a fourth pushing member having a seventh rotational axis disposed parallel to the fifth rotational axis and an eighth rotational axis orientated perpendicular to the seventh rotational axis, the first, third fifth and seventh axis laying in a single plane, the second pushing member adapted to urge the substrate in a fourth direction that is opposite the third direction.

14. The apparatus of claim 13, wherein the first pushing member further comprises a concave face.

15. The apparatus of claim 14, wherein the third direction is tangential to the concave face of the first pushing member.

16. The apparatus of claim 13 further comprising:

an actuator coupled to at least one of the pushing members.

17. The apparatus of claim 13, wherein the actuator is a cooling plate move relative to the first axis.

18. A load lock chamber for transferring a substrate between a first environment and a second environment, the load lock chamber comprising:

- a chamber body having a first substrate transfer port and a second substrate transfer port;
- a support plate disposed within the chamber body and having a first side adapted to support the substrate passed through either the first or second substrate transfer ports;
- a first body disposed proximate a first edge of the support plate and having a first rotational axis parallel to the first edge; and
- a first pushing member coupled to the first body and having a second rotational axis perpendicular to the first rotational axis, the pushing member adapted to urge the substrate in a first direction when the body is rotated about the first axis.

19. The load lock chamber of claim 18, wherein the first pushing member has a concave face adapted to urge the substrate.

20. The load lock chamber of claim 18, wherein the first body is coupled to an actuator.

21. The load lock chamber of claim 18, wherein the first body further comprises:

- a first flange;
- a second flange;
- a center portion coupling the first and second flanges;
- a first hole formed through the first and second flanges coaxial with a first axis of rotation of the body; and
- a roller disposed between the first and second flanges, the roller having a second axis of rotation parallel to the first axis of the body, the second axis defined between the first axis and the center portion.

22. The load lock chamber of claim 21 further comprising a biasing member disposed between at least one of the first and second flanges and the roller, the biasing member adapted to urge the body about the first axis.

23. The load lock chamber of claim 21 further comprising:
a cooling plate; and
an actuation finger coupled to the cooling plate and adapted to urge the roller as the cooling plate is displaced relative to the body.

24. The load lock chamber of claim 18 further comprising:
a second body rotationally disposed proximate a second edge of the support plate, the second edge disposed adjacent the first edge; and
a second pushing member radially coupled to the second body and adapted urge the substrate in a second direction that is different than the first direction when the second body rotates.

25. The load lock chamber of claim 24, wherein the first direction is perpendicular to the second direction.

26. A load lock chamber for transferring a substrate between a first environment and a second environment, the load lock chamber comprising;
a chamber body having a first substrate transfer port and a second substrate transfer port;
a support plate disposed within the chamber body and having a first side adapted to support the substrate passed through either the first or second substrate transfer ports;
a first alignment mechanism disposed proximate a first edge of the support plate having a first pushing member having a first rotational axis parallel to the first edge, the pushing member adapted to urge the substrate in a first direction when rotated about the first axis;
a second alignment mechanism disposed proximate a second edge of the support plate and having a second pushing member having a second rotational axis parallel to the first rotational axis, the second pushing member

adapted to urge the substrate in a second direction that is opposite the first direction when rotated about the second axis;

a third alignment mechanism disposed proximate a third edge of the support plate that is disposed between the first and second edges, the third alignment mechanism having a third pushing member having a third rotational axis perpendicular to the first rotational axis, the third pushing member adapted to urge the substrate in a third direction that is perpendicular the first direction when rotated about the third axis;

a fourth alignment mechanism disposed proximate a fourth edge of the support plate and having a fourth pushing member having a fourth rotational axis parallel to the third rotational axis, the fourth pushing member adapted to urge the substrate in a fourth direction that is opposite the third direction when rotated about the fourth axis; and

a cooling plate movably disposed within the chamber body and adapted to cause the first through fourth alignment mechanisms to rotate when moved towards the support plate.

27. The load lock chamber of claim 26, wherein the first pushing member has a surface that rotates about an axis that is perpendicular to the first rotational axis, wherein the third direction is tangential to the surface.

28. A method for aligning a substrate on a substrate support, the method comprising:

placing a substrate on a support;

rotating a first pushing member to urge the substrate in a first direction; and

rotating a second pushing member to urge the substrate in a second direction different than the first direction.

29. The method of claim 28, wherein the step of rotating a first pushing member further comprises:

rotating the first pushing member about a first axis defined parallel to the support.

30. The method of claim 29 further comprising;
rotating the first pushing member a second axis defined perpendicular to the first axis.
31. The method of claim 28 wherein the step of rotating a first pushing member further comprises:
elevating a cooling plate towards the support to cause the rotation of the first pushing member.
32. A method for aligning a substrate on a substrate support, the method comprising:
placing a substrate on a support;
elevating a cooling plate towards the support to actuate an alignment mechanism; and
moving a first pushing member of the alignment mechanism towards a center of the support in response to the actuation to urge the substrate in a first direction.
33. The method of claim 32, wherein the step of moving the first pushing member further comprises:
at least rotating or linearly displacing the first pushing member.
34. The method of claim 32 further comprising rotating the first pushing member a second axis defined perpendicular to the first direction.
35. The method of claim 32, wherein the step of elevating a cooling plate further comprises:
actuating a second alignment mechanism; and
moving a second pushing member of the second alignment mechanism towards the center of the support in response to the actuation to urge the substrate in a second direction perpendicular to the first direction.

36. A method for aligning a substrate on a substrate support, the method comprising:

 placing a substrate on a support;

 elevating a cooling plate towards the support to actuate an alignment mechanism;

 rotating a first pushing member towards a center of the support in response to the actuation to urge the substrate in a first direction; and

 rotating the first pushing member a second axis defined perpendicular to the first direction.